PROPOSED OBSERVATIONS IN METEOROLOGY TO BE UNDERTAKEN DURING THE EXPEDITION TO OBSERVE THE TOTAL ECLIPSE OF THE SUN IN SPAIN AND TUNIS, AUGUST 30, 1905.

By Prof. FRANK H. BIGELOW.

In response to the invitation of Rear-Admiral C. M. Chester, U. S. Navy, superintendent of the Naval Observatory, the Weather Bureau has undertaken to organize a series of meteorological observations in connection with the Eclipse Expedition sent by the Navy Department to observe the total eclipse of the sun on August 30, 1905. Since there is an uncertainty as to the outcome of the observations during totality, depending upon the prevailing weather conditions, several collateral lines of work have been planned, which are independent of that contingency. Prof. Frank H. Bigelow and Dr. Stanislav Hanzlik from the Weather Bureau, in cooperation with the officials of the Navy, will execute the program as far as practicable.

1. *Meteorological observations.*—It is proposed to establish three astronomical stations, one in Africa and two in Spain, and these will be equipped with the usual instruments for recording the pressure, temperature, humidity and vapor tension, wind direction, and velocity. In addition, each primary station will have two secondary stations arranged to form three belts across the track, so that there shall be one station near the center and one on each side of the track of totality, which is 120 miles in width.

2. *Shadow band observations.*—Suitable circular letters, in English and Spanish, with a track map of the eclipse from the Bay of Biscay to Egypt, have been prepared, giving instructions for the observations and forms for recording them. These will be distributed freely along the track to volunteer observers, who have been requested to return their reports to the American Legation in Madrid, Spain.

3. *Radiation observations.*—We have secured two types of radiation apparatus, (1) an Ångström pyrheliometer, and (2) an Abbot actinometer, which will be used in connection with a Pickering polarimeter for measuring the percentage or sky polarization. These instruments have been compared with the apparatus employed by Mr. H. H. Kimball, of the Weather Bureau, in his series of radiation observations now covering more than two years, and the eclipse records will be standardized by them. It is hoped that observations can be made with the globe actinometer on the sea voyage, as a connecting link between those made in the United States and Europe.

4. *Electrical observations.*—The instruments ordered from Günther and Tegetmeyer, Brunswick, Germany, for the Mount Weather Observatory, will be available for this expedition. There are four complete sets of apparatus for measuring the electric potential (Exner electroscope), four sets for counting the number of ions per cubic centimeter of air (Ebert aspiration apparatus), and four sets for measuring the coefficient of electrical dissipation (Elster and Geitel form). These will be used if suitable observers can be secured in the time at our disposal.

5. *Kite observations.*—A complete outfit of the Marvin kite and recording meteorographs will be installed on the U. S. S. *Caesar*, for use on the voyages from Norfolk to Gibraltar, and in the Mediterranean to Tunis, and return. An effort will be made to secure observations of the temperatures, pressure, humidity, wind direction, and velocity in this portion of the Atlantic Ocean. The outward voyage will take place during the first half of July and the return voyage in September.

The organization of so many lines of work will require suitable details of assistants from the ships of the American squadron under command of Rear-Admiral Chester, but as the officers are well adapted to take up these observations, it is believed that there will be no difficulty in executing an important part of the schedule as outlined in this paper.

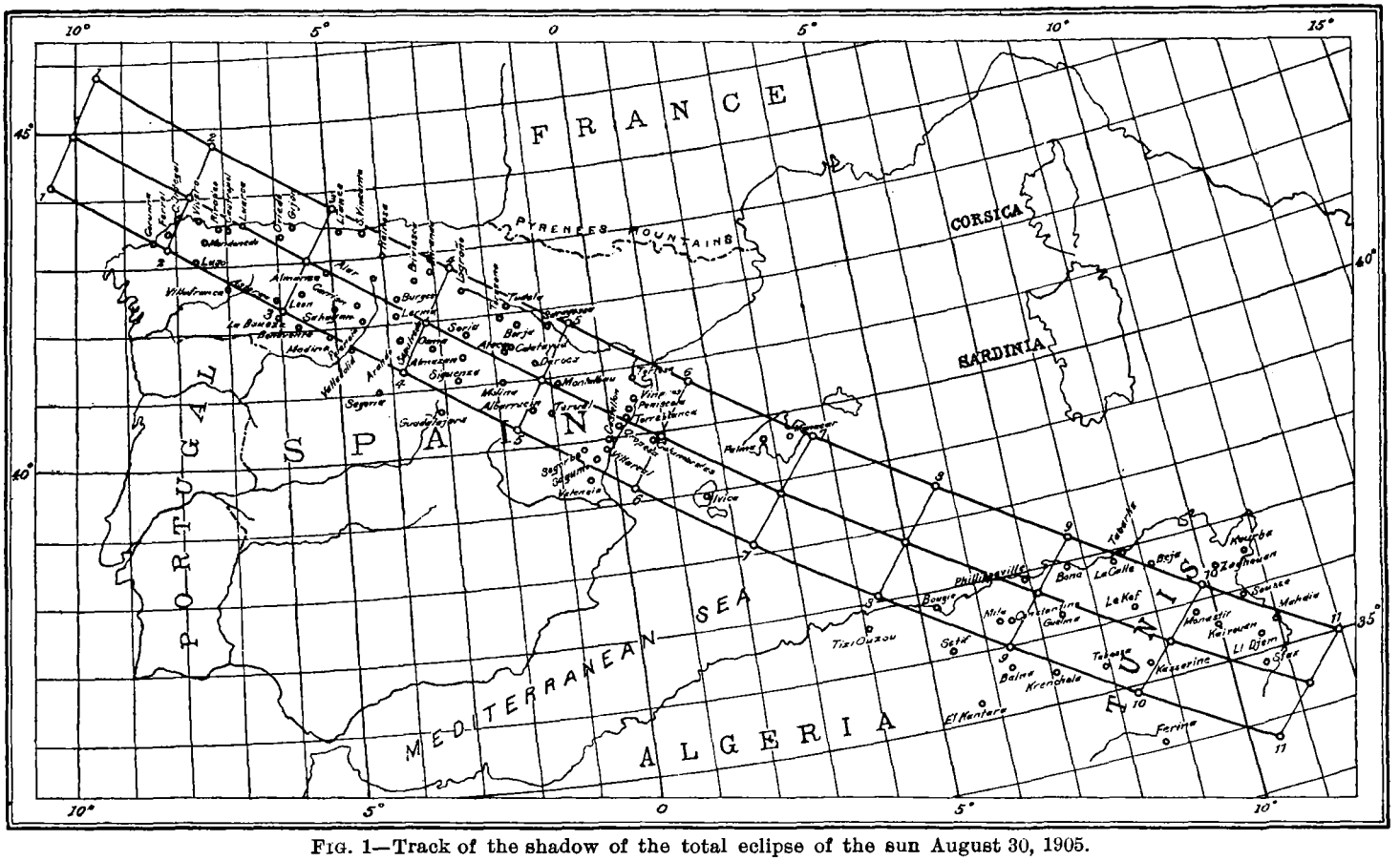

FIG. 1—Track of the shadow of the total eclipse of the sun August 30, 1905.